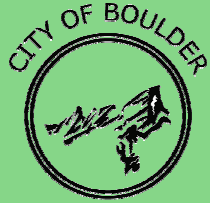


Thursday, Feb 21, 2008

City of Boulder

Green Points Program

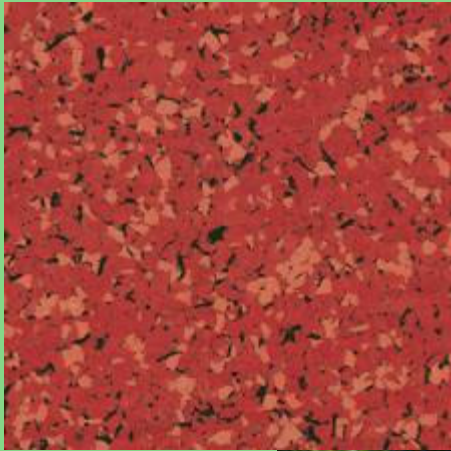
# Materials



# Green Building and Green Points Program Process

- Residential building permits over 500 sq. ft. trigger above code requirements
- Planning & Development Services (P&DS) administer building permits, including above code programs
- Office of Environmental Affairs (OEA) spearheads the outreach and education on sustainable and green building, climate, waste and other environmental programs

# Materials



**ML Robles, NCARB LEED AP**  
**Green Building Materials Specialist**  
**Studio Points Architecture + *research***

# Materials

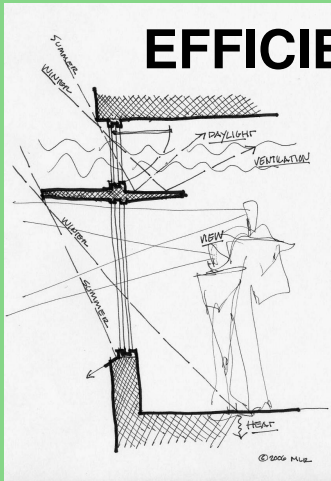


**DESIGN**



**SPECIFY**

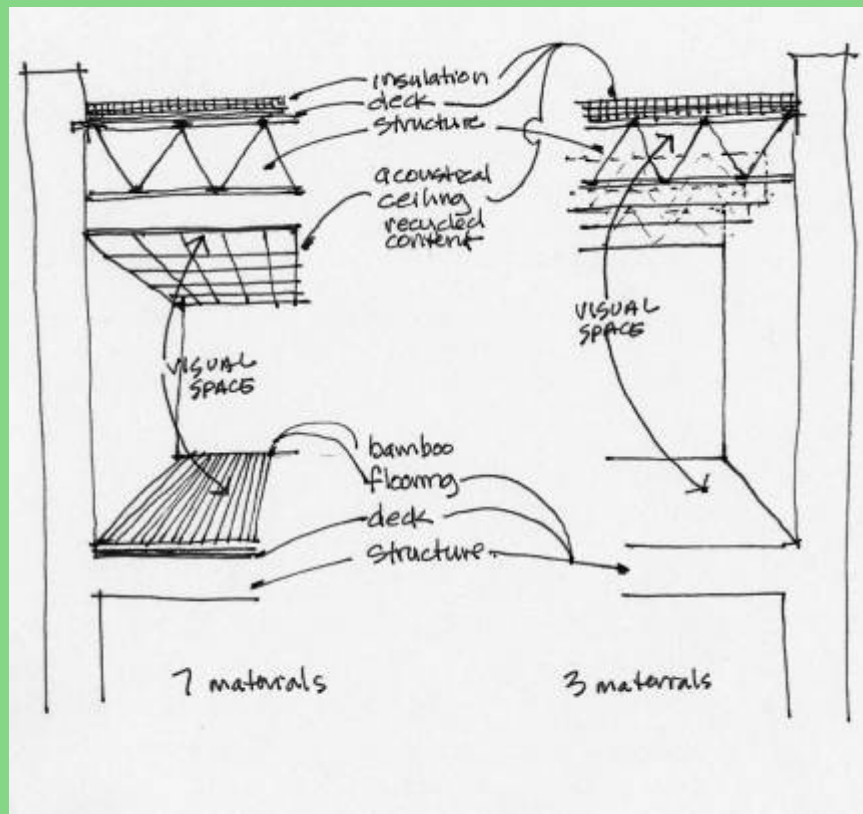
**EFFICIENT + EFFECTIVE**



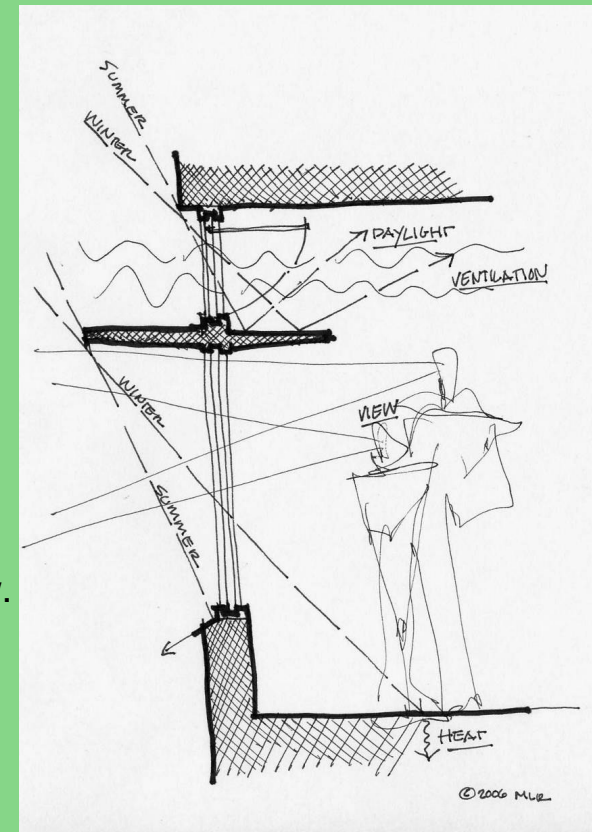
**RESOURCE RESPONSIBLE**



Much of green buildings' world attention is on products and technology, but without good design methods and tools, those products can easily be wasted.



For example, windows become highly cost effective when they are designed and placed to provide daylight, passive solar heating, summer heat-gain avoidance, natural ventilation, and an attractive view.





Most  
sustainable

REUSE

RECYCLED  
CONTENT

RAPIDLY  
RENEWABLE

FSC WOOD

VIRGIN

Least  
sustainable



Mason's Bend  
Community  
Center,  
Mason's Bend  
Alabama

The Rural  
Studio





# Green Points Requirement Levels

Project Description	Square Footage	Green Point Requirements
<b>New Dwelling Unit – Single Family</b>	1,501-3,000	20
	3,001-5,000	40
	5,001 and up	60
<b>New Dwelling Unit – Multi-Family</b>	1,001-2000	10
	2,001-3000	20
	3,001 and up	30
<b>Addition to a Dwelling Unit</b>	500-1,000	15
	1,001-2,000	20
	2,001-3,000	30
	3,001 and up	45
<b>Remodel of a Dwelling Unit</b>	500-1,000	10
	1,001-2,000	15
	2,001-3,000	20
	3,001 and up	30

# City of Boulder Green Building and Green Points Program

		PHASE					POINTS POSSIBLE
		Design	Engineering	Pre-Permit	Final Construction Inspection	Post Construction	
	<b>GREEN POINT</b> New Dwelling Unit-Single Family =ND-SF New Dwelling Unit-Multi_ Family =ND-MF Additions and Remodels =AR						
v							
	<b>(a) ENERGY EFFICIENCY</b>	<b>D</b>	<b>E</b>	<b>PP</b>	<b>FC</b>	<b>PC</b>	
	ND <= 3,000sf 30% more energy efficient than 2006 IECC		X				HERS 70
	ND 3,001-5,000sf 50% more energy efficient than 2006 IECC		X				HERS 60
	ND 5,001sf and up 75% more energy efficient than 2006 IECC		X				HERS 35
	ND-MF: all units 30% more energy efficient than 2006 IECC		X				HERS 70
	<b>(b) ENERGY EFFICIENCY -HERS INDEX RATING</b>						
	ND energy performance verification					X	provide HERS certificate
	<b>(c) ENERGY AUDIT</b>						
	AR quantify annual energy performance			X			provide audit at permit application
	<b>(d) LIGHTING EFFICIENCY</b>						
	AR install energy efficient lamps w/ luminous efficacy 40 lumens/watt or above in min. 50% of existing home's light fixtures				X		
	<b>(e) DIRECT VENT FURNACE</b>						
	AR if replacing furnace, must be direct vent min 90% AFUE		X				furnace must meet standard
	<b>(f) CONSTRUCTION WASTE RECYCLING</b>						
	ND/AR shall demonstrate minimum of 50% construction waste is recycled				X		waste diversion calculations and tracking spreadsheet form must be provided at project completion
	<b>(g) DEMOLITION MANAGEMENT</b>						
	proposed demolition >50% exterior walls shall divert 65% of material by weight from landfill				X		provide deconstruction plan and verify compliance with plan prior to final inspection

MANDATORY



	(b) SITE DEVELOPMENT	D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) Landscaping							
2	(A) Organic Soil Amendments	X						2
	(B) Xeriscape Landscaping							
	(i) reduce turf area to minimum	X						1
	(ii) 3" deep wood chip mulch at planting beds	X						1
	(iii) group like water need xeric plants	X						1
	(iv) zoned irrigation system	X						1
	(2) Shading of Hardscapes							
	(A) Preserve Existing Mature Trees on site	X					1 point per tree preserved, 5 points possible	1
	(B) Plant Shade Trees	X					1 point per tree, 5 points possible	1
	(3) Surface Water Management							
	>= 50% permeable site	X						1
	>= 75% permeable site	X						2
	>= 90% permeable site	X						3
4	100% permeable site	X						4
	(4) High Efficiency Automatic Irrigation							
	(A) 75% efficiency rating	X						1
	(B) 95% efficiency rating	X						2
	(c) BUILDING REHABILITATION	D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) Rehab/retrofit existing + historic windows and doors	X					up to 5points, .5 point per item	1
	(2) Storm System installed interior/exterior	X					up to 5points, .5 point per item	1
	(3) Property is within a historic district or designated individual landmark			X				5
	(d) WASTE MANAGEMENT	D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) Reuse existing building							
	(A) Save 50% of exterior walls	X						3
	(B) Save 75% of exterior walls	X						5
	(2) Remodels, Additions, and Demolitions waste diversion							
	(A) 75% deconstruction materials diverted from landfill				X			2
	(B) 85% deconstruction materials diverted from landfill				X			3
	(3) New Construction Waste Recycling							
	(A) 75% waste materials diverted from landfill				X			2
	(A) 85% waste materials diverted from landfill				X			3

	(e) ENERGY EFFICIENCY	D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) Insulation							
2	(A) Min R-19 cavity plus R-5 sheathing wall insulation	X						2
2	(B) Min R-49 ceiling	X						2
2	(C ) Min R-10 installed full height exterior bsmt/fndt wall	X						2
2	(D) Insulated Pre-cast Concrete foundations R-5	X						2
	(E) insulated Concrete Forms	X						2
	(2) Windows: new windows installed						National Fenestration Rating Council -NFRC;	
	(A) NFRC rated windows with max U .35 or lower	X					up to 5 points, .5 per window	5
	(B) NFRC rated windows with max SHGC of .55	X					Solar Heat Gain Coefficient-SHGC, .5 per window; south facing glass excepted	5
	(3) HERS for Existing Building							
	(A) no net increase to initial HERS rating		X			X		3
	(B) decrease to initial HERS rating		X			X		5
	(4) HVAC Systems						testing for duct leakage, firing rate, and refrigerant charge	
	(A) HVAC Commissioning					X		3
	(B) Ground Source Heat Pump		X				up to 10 points possible	
	30-39% calculations from a heating/cooling load bin (i) analysis		X					4
	40-49% calculations from a heating/cooling load bin (ii) analysis		X					6
	50-59% calculations from a heating/cooling load bin (iii) analysis		X					8
	60-69% calculations from a heating/cooling load bin (iv) analysis		X					10
	(C ) Direct Vent Combo Space/Water Heating System		X					2
	(D) Energy Star Boiler	X						2
	(E) Zoned, Hydronic Radiant Heating	X						2

	(F) Passive Cooling	X					to get any point must use at least two strategies	
	Exterior vertical shading devices for east/west facing (i) glass	X						1
	(ii) Reflective films or glass on east/west facing windows	X						1
	Radiant, heat -reflective barriers installed in the attic (iii) space	X						1
	Landscaping that shades east/west facing glazing during (iv) the cooling season (June-Sept)	X						1
	South window overhang sized to effectively shade window (v) during cooling season (June - Sept)	X						1
	(G) Whole House Fan	X						2
	(H) Evaporative Cooling	X						3
	(5) Water Heater							
	(A) Tankless Water Heater	X						2
	(B) Point-of-use Water Heater	X						2
	(6) Lighting, Appliances, and Electricity							
	(A) Energy Star Advanced Lighting Package	X					must meet all three criteria	5
	(i) High-use rooms to have 50% of total fixtures	X					kitchen, dining room, living room, family room, bathrooms, halls, stairways	
	(ii) Med-Low use rooms have 25% of total fixtures	X					bedrooms, dens, offices, basement, laundry room, garage, closets, and all other rooms	
	(iii) Outdoor to have 50% of total number of fixtures	X					lights affixed to structure or free standing pole except for landscape and solar lighting	
	(B) Efficient Light Controls	X					devices include occupancy sensors, dimming controls, and automatic daylight dimming controls	
	(i) 4 control devices	X						1
	(ii) 6 control devices	X						2
	(C ) Energy Efficient Appliances	X						
	(i) Energy Star rated refrigerator	X						2
	(ii) Energy Star rated clothes washer	X						2
	(iii) Energy Star rated freezer	X						1
	(iv) Energy Star rated dishwasher	X						1

(f) SOLAR		D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) Passive Solar Heating Design						up to 12 points possible	
	(A) 40-49% verifying calcs of solar heat gain fraction		X					6
	(B) 50-59% verifying calcs of solar heat gain fraction		X					8
	(C ) 60-69% verifying calcs of solar heat gain fraction		X					10
	(D) >70% verifying calcs of solar heat gain fraction		X					12
	(2) Solar Domestic Hot Water System		X				providing at least 50% of the HW load	8
	(3) Solar Thermal Space Heating, or Pool/Spa System		X				offset minimum of 15% if annual space heating or pool/spa load	3
	(4) Pre-plumb for Solar Thermal System Retrofit				X			2
	(5) Active Solar Electric System						up to 12 points possible	
	(A) 30-39% solar electricity or eq. 2KW system		X					6
	(B) 40-49% solar electricity or eq. 3KW system		X					8
	(C ) 50-59% solar electricity or eq. 4KW system		X					10
	(D) >60% solar electricity or eq. 5KW system		X					12
	(6) Pre-Wire for Future Solar Electric Installation Retrofit				X			2
(g) WATER EFFICIENCY		D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) 25% of all fixtures are high efficiency- low flow	X						2
	(2) 50% of all fixtures are high efficiency- low flow	X						4
4	(3) 75% of all fixtures are high efficiency- low flow	X						6
(h) MATERIAL EFFICIENCY FRAMING AND STRUCTURE		D	E	PP	FC	PC	REQUIREMENTS/RESOURCES	
	(1) Advanced Framing Techniques							
	(A) 24" on-center framing	X						2
2	(B) Insulated Headers	X						2
2	(C ) Energy Efficient Roof Trusses	X						2
	(D) HVAC Ducts within conditioned spaces		X					2
	(E) Min 12" roof overhang	X						2
	(2) Structural Insulated Panels (SIPs)							
5	(A) at least 50% of exterior walls	X						5
3	(B) at least 50% of exterior walls and roof	X						8
	(3) Structural Alternatives to Wood							
5	(A) at least 50% of exterior walls	X						5
3	(B) at least 50% of exterior walls and roof	X						8

16	<b>(i) SUSTAINABLE PRODUCTS</b>	<b>D</b>	<b>E</b>	<b>PP</b>	<b>FC</b>	<b>PC</b>	<b>REQUIREMENTS/RESOURCES</b>	
	(1) FSC Certified tropical or not tropical woods							
	(A) 2BF of FSC lumber per sf of floor area				X			2
	(B) 3BF of FSC lumber per sf of floor area				X			4
	(C ) 50% or more of dimensional lumber in total BF is FSC, excluding engineered wood products				X			6
	(2) Environmentally Preferred Materials						see chart	
	(A) Recycled Content	X					25% post-consumer recycled content	2
	(B) Reclaimed	X						2
	(C ) Bio-based	X						2
	(D) Agricultural residue	X						2
	(E) Low or no VOC emissions	X						2
	(3) Locally Sourced Materials						extracted, processed and manufactured within 500 miles of the city	
	<b>(j) INDOOR AIR QUALITY</b>	<b>D</b>	<b>E</b>	<b>PP</b>	<b>FC</b>	<b>PC</b>	<b>REQUIREMENTS/RESOURCES</b>	
10	(1) Energy Star IAQ Package requirements		X				new construction and Energy Star qualified homes only qualify for these	10
	(2) Mechanical Ventilation							
	(A) Installation of kitchen exhaust fan	X						1
	(B) Bath exhaust fan with timer or humidistat controls	X						1
	(C ) Ventilation integration with HVAC		X					1
	(D) Incorporate Heat Recovery Ventilation		X					2
	(3) High Efficiency HVAC Filter		X					1
	(4) Radon Mitigation							
	(A) Passive System		X					1
	(B) Active System		X					2
	(5) Attached Garage Exhaust Fan							1

	<b>(k) HOMEOWNER INFORMATION</b>	<b>D</b>	<b>E</b>	<b>PP</b>	<b>FC</b>	<b>PC</b>	<b>must provide all 4 items</b>	<b>1</b>
	(1) The Green Points checklist					X		
	(2) Home Energy Audit or HERS certificate					X		
	(3) The equipment manufacturer's installation manuals, except those required to be affixed to the equipment					X		
	(4) Copies of operations and maintenance instructions for equipment installed in home					X		
	<b>(l) DESIGN PROCESS AND INNOVATION</b>	<b>D</b>	<b>E</b>	<b>PP</b>	<b>FC</b>	<b>PC</b>	<b>REQUIREMENTS/RESOURCES</b>	
	(1) Green Building Consultant							2
	(2) Energy Star Builder							1
	(3) Innovation points: up to 10							
64	<b>MATERIAL RELATED POINTS</b>							

Material related GreenPoints may not all be applicable or appropriate to your building.



### (3) Surface Water Management - Permeable Sites: Up to 4 points

As lot coverage increases with greater density, handling storm water runoff on site becomes more difficult. By encouraging the use of permeable surfaces beyond the building, more water can passively infiltrate on site, reducing the need for designed detention systems.

**Application:** Submit a site plan or planting plan prepared by a qualified professional (architect, planner, landscape architect, or equivalent) that shows calculations for the total lot area, building coverage, and permeable surfaces. All planted areas shall be clearly labeled with their plant cover. Include product information for all permeable paving materials. Design sites to maximize permeability to reduce run-off and increase groundwater recharge. For this section, site area is defined as the total lot area that is not covered by the building footprint. Areas that count toward the minimum include:

- Vegetative landscape or plant cover (grass, trees, shrubs, perennials, etc.)
- Permeable paving, installed by an experienced professional. Permeable paving must include porous above ground materials (open pavers, engineered products, etc.) and a porous 6-inch sub-base. The base layer must be designed to ensure proper drainage away from the house.

1 point—If greater than 50 percent of the site is permeable

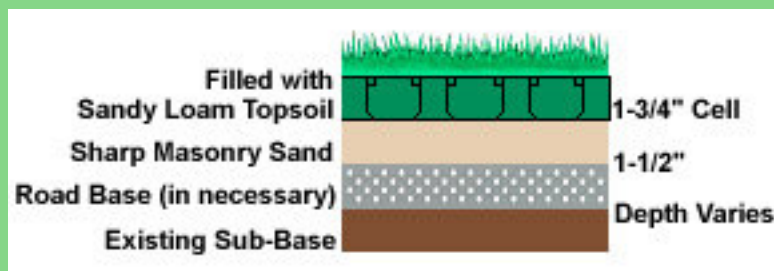
2 points—If greater than 75 percent of the site is permeable

3 points—If greater than 90 percent of the site is permeable

4 points—If 100 percent of the site is permeable

Percentage of site that is permeable	Points
> or equal to 50%	1
> or equal to 75%	2
> or equal to 90%	3
100%	4

**Verification:** To receive points, applicant must submit a site plan or planting plan with the Green Points application. The plan is reviewed during plan review and final inspection.



### (1) Insulation

Insulation is rated in terms of thermal resistance, called R-value, which indicates the resistance to heat flow. R-values are determined by material type, thickness and installed weight per square foot, not by thickness alone. For those projects that are not required to go through the HERS process, such as remodels and additions, incorporating construction that has a higher R-value can be used to attain Green Points.

#### Wall Insulation: 2 points

**Application:** For this point option, 2" x 6" wall studs, R-19 minimum wall cavity insulation, plus R-5 insulative wall sheathing must be used.

**Verification:** Checked during plan review and during insulation inspection.

#### Ceiling Insulation: 2 points

**Application:** For this point option, a minimum ceiling insulation R-value of 49 must be attained.

**Verification:** Checked during plan review and during insulation inspection.

#### Basement or Foundation Insulation: 2 points

**Application:** A minimum R-10 insulation must be installed on the exterior of the full height of a basement or foundation wall. Insulating a basement wall in this manner creates the benefit of adding the basement walls' considerable thermal mass to the conditioned side of the wall.

**Verification:** Checked during plan review and during insulation inspection.

#### Insulated Pre-cast Concrete Foundation: 2 points

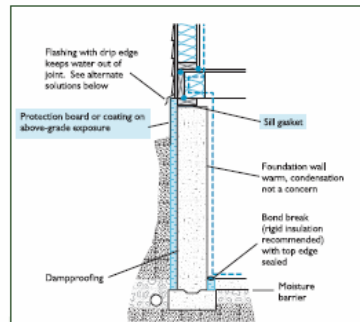
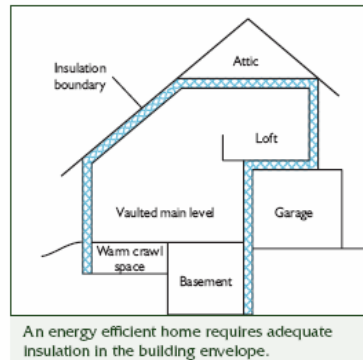
**Application:** For this point option, a panelized foundation wall system that has a minimum R-5 insulation integral to the panel must be used. Pre-cast foundation wall panels allow a foundation wall to be built with fewer materials than conventional site-cast foundation walls, and the integral insulation helps reduce heat loss through the wall.

**Verification:** Inspected during foundation inspection.

#### Insulated Concrete Forms: 2 points

**Application:** For this point option, an insulated concrete form system must be used for the foundation. The foam forms stay in place and add to the energy efficiency of the wall.

**Verification:** Inspected during plans review and during insulation inspection.



Example of insulated basement  
[Contact your green building professional for construction details on your project.]





## (h) Material Efficient Framing and Structure

### (1) Advanced Framing Techniques: Up to 10 points

Conventional framing techniques use about 15 to 20 percent more framing material than the following material-efficient framing systems. Advanced or efficient framing practices can reduce the need for lumber while still providing sufficient structural support. A reduction in lumber demand reduces material costs and can also reduce labor and shipping costs.

**Application:** Advanced framing techniques must be specified in building permit plans with details called out for framing carpenters. At least two of the options below must be incorporated together to receive points for this point option.

**Verification:** These measures must be included on design plans and inspected during plan review.

#### a. 24-inch On-Center Framing: 2 points

By using 2" x 6" studs on 24-inch centers rather than 2" x 4" studs on 16-inch centers, builders save time and labor costs (offsetting slightly higher per-item material cost). The increased room for insulation allows for additional insulation in wall cavities, which improves thermal performance and saves the homeowner money on energy bills.

#### b. Resource Efficient Insulated Headers: 2 points

Insulated headers reduce thermal bridging to increase the energy efficiency of the wall framing. Green Points are awarded for incorporating a minimum R-10 insulation in the header section.

#### c. Energy Efficient Roof Trusses: 2 points

The perimeter intersection between walls and roof framing is often an area of increased heat loss because conventional trusses reduce the cavity that can accept insulation to less than 6 inches. Raising the heels on trusses allows for full insulation around the house, saving energy and money. Install where conventional trusses are used. The increased height may require modifications to exterior soffit and trim design.

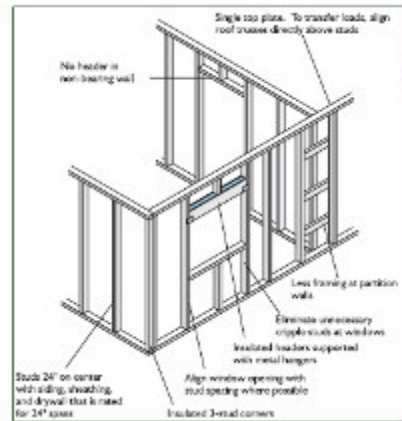
#### d. HVAC Ducts Within Conditioned Spaces: 2 points

Installing all of the ductwork within the conditioned spaces of the home reduces heat loss/gain and air leakage compared to duct systems installed in unconditioned spaces. Detailing the plans to show that all of the HVAC ducts can be accommodated within conditioned space will allow the Green Points shown above to be awarded.

#### e. Minimum 12-inch Roof Overhangs: 2 points

Design at least a 12-inch overhang with gutters around the building's entire roof. Install gutter and downspout system to divert water five feet away from foundation and, from there, into the overall on-site drainage area or install crushed stone or other ma-

terial below roof drip line to minimize splash on siding in high snow areas. Overhangs and gutters protect siding, windows, and doors from water intrusion, thereby reducing the likelihood of rot and mold issues. Overhangs also provide protection from the sun's harsh UV rays, which can degrade building materials and furnishings. All overhangs must meet building code and zoning restrictions.



Ken Collins, DRIHS



Paul Norton, NREL, IBC 14138

The raised heel trusses in this zero energy Habitat for Humanity home allow room for R-60 ceiling insulation.



Paul Norton

A properly-sized overhang, like the one on a Habitat for Humanity home, will shade south windows in the summer but allow solar gain in the winter.



PIX 07358



## (2) Structural Insulated Panels (SIPs): Up to 8 points

Structural insulated panels (SIPs) are more energy efficient, provide excellent soundproofing, and reduce infiltration relative to frame construction. Panels can be erected more quickly providing for faster construction. SIPs also save wood and reduce waste on site compared to conventional framing. Green Points will be awarded for the use of SIPs according to the following:

5 points—at least 50 percent of exterior walls

8 points—at least 50 percent of exterior walls and roof

*Application:* Incorporating SIP construction requires that stamped plans be submitted from a designer.

*Verification:* The applicant must provide plans or designs certified by a structural engineer and in compliance with the requirements of the Boulder Revised Code, Title 9 B.R.C.

## (3) Structural Alternatives to Wood: Up to 8 points

Alternative building methods that demonstrate energy- and resource-efficient construction with less embodied energy are awarded Green Points according to the following:

5 points—at least 50 percent of exterior walls

8 points—at least 50 percent of exterior walls and roof

*Application:* Exterior walls must be constructed with alternative materials, which may include, but are not limited to, adobe, rammed earth, and straw bale.

*Verification:* The applicant must provide plans or designs certified by a structural engineer and in compliance with the requirements of the Boulder Revised Code, Title 9 B.R.C.



Sara Farar, NREL

Structural insulated panels combine insulation and structural materials in a panel that can be installed quickly to create an energy efficient home.



Emily Minton-Redfield for Jim Logan Architects

The passive solar Logan-Wiggins home near Boulder features Insulated double adobe brick exterior walls and rammed earth interior walls.





## (i) Sustainable Products

### (1) FSC-Certified Tropical Woods or No Tropical Wood: Up to 6 points

Forest Stewardship Council (FSC) certification assures that the forest from which the wood was harvested is managed in an environmentally, economically, and socially responsible manner. FSC maintains chain-of-custody certification throughout the cutting, milling, and final delivery of products, thus ensuring that wood labeled as FSC actually came from a certified sustainably managed forest. Although other certification systems maintain chains of custody, FSC remains the most robust certification program.

2 points—2 BF (board feet) of FSC lumber per square foot (SF) of floor area (2 BF/SF)

4 points—3 BF of FSC lumber per SF of floor area (3 BF/SF)

6 points—50 percent or more of dimensional lumber in total BF is FSC, excluding engineered wood products

The biological wealth of the tropical rainforests, and their devastation due to poor forestry practices, are of such great importance that they merit singular treatment in this credit. Tropical wood can end up in a wide variety of products unbeknownst

to the purchaser. For the purposes of this option, a species of wood is considered "tropical" if it is grown in a moist country that lies, either in part or in its entirety, between the tropics of Cancer and Capricorn. See Chart A below.

**Chart A: Tropical Countries by Continent**

Continent	Tropical Countries
Africa	All except Morocco, Tunisia, Algeria, Egypt and Libya
Asia & Southeast Asia	All except Japan, N. & S. Korea and Russia
Australia/Oceania	All except New Zealand
Central America and Caribbean	All countries
Europe	None
Middle East	None
North America	Mexico
South America	All except Uruguay

Products containing tropical woods, if intentionally used (specified in purchasing documents), must be certified in accordance with the guidelines of the FSC. Reused or reclaimed wood products are exempt.

The builder shall provide all wood product suppliers with a notice containing the following elements:

- Statement that the builder's preference is to purchase products containing tropical woods only if they are FSC-certified.
- Request for the country of manufacture of each product supplied.
- Request for a list of FSC-certified products the vendor can supply.

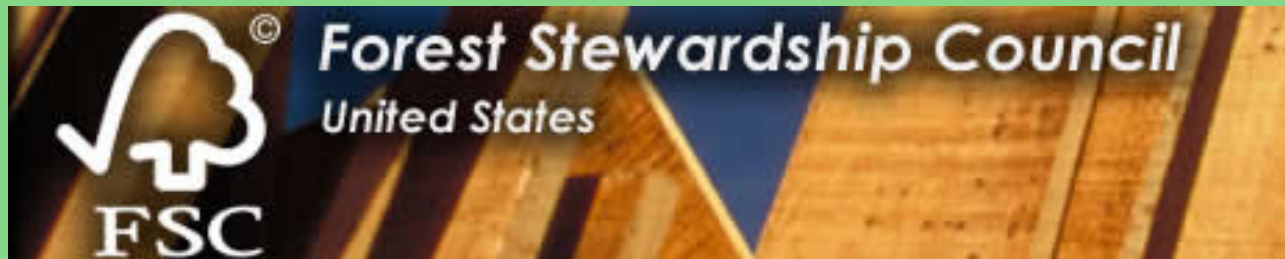
**Verification:** The builder or responsible party will sign the Accountability Form declaring that all tropical wood, if used, is FSC-certified. Also, attached to the Accountability Form must be a copy of the FSC Chain of Custody certification and/or invoice from supplier. Place in building permit sleeve before final inspection.



Collin Tomb

A unique certification number identifies every FSC lumber unit from the mill to the contractor.





*Companies with Chain-of-Custody  
Certificates*

[SHOW CERTIFIED FORESTS](#)

[Boise Building Material Distribution](#)

Mike Slater  
Denver, CO  
(303) 289-3271

[Strait Lumber Company](#)

Mark Strait  
Aurora, CO  
(303) 366-3561

[Sterling Lumber and Investment Company, The](#)

Al Jamieson  
Denver, CO  
(303) 443-0582

[Austin Hardwoods of Denver, Inc.](#)

Randy Hass  
Denver, CO  
(303) 733-1292

[Performance Woodworking](#)

Dave Watkins  
Commerce City, CO  
(303) 227-9441

[Vision Graphics, Inc.](#)

Bill Jones  
Loveland, CO  
(970) 679-9133

[New World Millworks, Inc.](#)

Rick DeSimone  
Selalia, CO  
(303) 791-9003

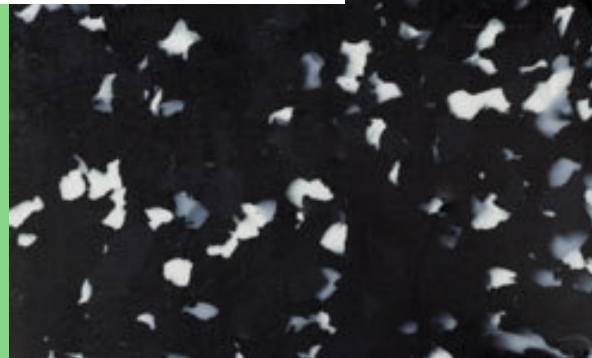
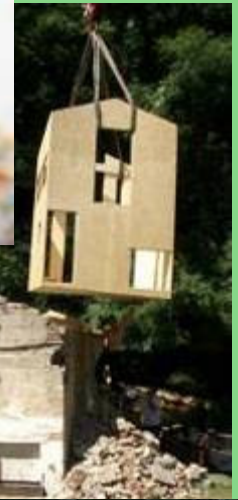


## (2) Environmentally Preferred Materials: Up to 10 points

Products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose are awarded Green Points if they meet the specifications in Chart B below. Many new products are available including those that have lower emissions, are sustainably produced, include recycled content, are rapidly renewable, etc. Qualifying products have more than one of these attributes:

- Recycled content
- Reclaimed
- Bio-based
- Agricultural residue
- Low or no volatile organic compounds (VOCs) emissions.

I. A "recycled content" product must contain a minimum of 25 percent post-consumer recycled content except as noted otherwise above. Post-industrial (pre-consumer) recycled content is counted at half the rate of post-consumer content. Points will be awarded as shown in Chart B below.



Artist House in reclaimed pigsty  
[www.fnp-architekten.de](http://www.fnp-architekten.de)



[www.hazardnebraska.com](http://www.hazardnebraska.com)

# Recycled Content

## Green Building Materials Recycled Content and Manufacturing Location Verification

Post Consumer material is waste material generated by end-users of the product.  
Pre Consumer material is waste material diverted from the waste stream during the manufacturing process.

PROJECT:

PRODUCT:

COMPANY:

Submitted by:

Date:

RECYCLED CONTENT VERIFICATION			
Information supplied by:			
		Weight	Recycled Content
Composite Material			% Post Consumer    % Pre Consumer
Components			
		Recycled Content	
Solid Material		% Post Consumer	% Pre Consumer

LOCATION VERIFICATION - if within 500 mile radius of jobsite	
Information supplied by:	
	Miles from jobsite
Material Harvesting Location:	
Material Manufacturing Location:	
Material Assembling Location:	

Additional back up information is attached \_\_\_\_\_ yes; \_\_\_\_\_ no.



# Bio Based and Agricultural Residue

## Green Building Materials Rapidly Renewable Content and Manufacturing Location Verification

Rapidly Renewable are plants that are typically harvested within a ten-year cycle or shorter.

PROJECT:

LOCATION:

PRODUCT:

COMPANY:

Submitted by:

Date:

### RAPIDLY RENEWABLE CONTENT VERIFICATION

Information supplied by:

		Weight	% Rapidly Renewable
Composite Material			
Components			
		% Rapidly Renewable	
Solid Material			

### LOCATION VERIFICATION - if within 500 mile radius of jobsite

Information supplied by:

	Miles from jobsite
Material Harvesting Location:	
Material Manufacturing Location:	
Material Assembling Location:	

Additional back up information is attached \_\_\_\_\_ yes; \_\_\_\_\_ no.





# Low or No VOC's

## Paints & Coatings

Various standards including the Green Seal Standards establish VOC content requirements for paint and coatings.



## Insulation

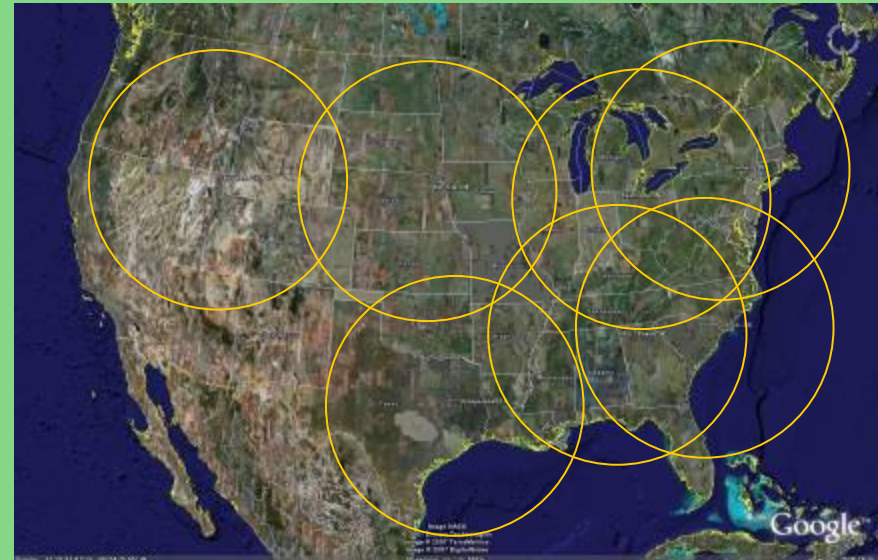
GreenGuard certified insulation meets the GreenPoints referenced standard.



### (3) Locally Sourced Materials

Products that are environmentally preferable and/or extracted, processed, and manufactured within 500 miles of the city are considered local. Applicants can earn a maximum of 2 points for any single component listed in Chart B regardless of the amount by which a minimum performance threshold is exceeded

500 mile radius from Denver, Colorado



STEEL:  
Mini-Mill: Electric Arc Furnace (recycled material)  
NUCOR STEEL PLANT LOCATIONS

**(j) Indoor Air Quality**

*(1) ENERGY STAR's Indoor Air Quality Package Requirements: 10 points (New Construction and ENERGY STAR qualified homes are eligible for this label ONLY. )*

ENERGY STAR's Indoor Air Quality Package (IAP) goes beyond energy efficiency and requires that duct leakage be controlled, the thermal envelope tightened, air pressures balanced, fresh air introduced, pest control measures installed, indoor contaminants reduced, and all major moisture issues managed. These requirements go very far in effectively managing building comfort, health, and durability.

For this point option, all of the requirements of EPA's ENERGY STAR Indoor Air Package must be met.

*Verification:* A HERS Rater must perform a visual inspection of installed measure(s) and relevant documents/test results, to affirm compliance and place an IAP Certificate and the Rater must sign off on this measure on the Accountability Form in building permit sleeve before final inspection.





## ENERGY STAR Indoor Air Package Verification Checklist

Address or Div/Lot#:		City:		State:		
Section	#	Requirements (see IAP for details)	N/A	Builder Verified	Rater Verified	Flex Spec
<b>ENERGY STAR Qualified Home</b>		verification complete, including Thermal Bypass Checklist			<input type="checkbox"/>	
<b>Moisture Control Features</b>	Water Managed Foundations	1.1 Surface water management system		<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Drain tile system at all footings		<input type="checkbox"/>	<input type="checkbox"/>	
		1.3 Capillary break below concrete slabs (Ex. see Spec)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		1.4 Below grade walls damp-proofed (Ex. slab-on-grade)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		1.5 Sump pump covers air sealed (Ex. no sump)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		1.6 Crawl spaces unvented, insulated, conditioned (Ex. see Spec)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		1.7 No vapor barrier on inside of basement/crawlspace walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Water Managed Wall Assemblies	1.8 Flashing system (or equivalent) at bottom of wall		<input type="checkbox"/>	<input type="checkbox"/>	
		1.9 Continuous drainage plane behind cladding		<input type="checkbox"/>	<input type="checkbox"/>	
		1.10 Air seal & align thermal/air barriers (E* TBC)		<input type="checkbox"/>	<input type="checkbox"/>	
		1.11 Fully flash windows and doors		<input type="checkbox"/>	<input type="checkbox"/>	
	Water Managed Roof Assemblies	1.12 Deck ledger board drainage system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		1.13 Air seal & align thermal/air barriers (E* TBC)			<input type="checkbox"/>	
		1.14 Step & "kickout" flashing		<input type="checkbox"/>	<input type="checkbox"/>	
		1.15 Gutter system or equivalent (Ex. Dry)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		1.16 No. 30 roof felt underlayment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		1.17 Drip edge at roof decking edges (Ex. Dry)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		1.18 Bituminous membrane at valleys & penetrations (Ex. Dry)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Plumbing Systems	1.19 Ice flashing at eaves (Ex. Zones 1-4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		1.20 Plumbing leak/damage protection		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Radon Resistant Construction</b>		2.1 Radon resistant features required (EPA Zones 1 & 2 only)		<input type="checkbox"/>	<input type="checkbox"/>	
		2.2 Provide 2 radon test kits (EPA Zones 1 & 2 only)		<input type="checkbox"/>		
<b>Pest Barriers</b>		3.1 Air seal foundation joints & penetrations (E* TBC)			<input type="checkbox"/>	
		3.2 Rodent & corrosion proof screens		<input type="checkbox"/>	<input type="checkbox"/>	
		3.3 Termite measures ("Moderate to Heavy" or above only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		3.4 Foam insulation restrictions ("Very Heavy" areas only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>HVAC Systems</b>	Heating & Cooling Equipment	4.1 Room loads & system sizing: Man J, ASHRAE, or equivalent			<input type="checkbox"/>	
		4.2 No air handler in garage			<input type="checkbox"/>	
		4.3 No equipment that intentionally produces ozone			<input type="checkbox"/>	
		4.4 Drain pan design and installation			<input type="checkbox"/>	
		4.5 System to maintain <60% RH (warm humid climates only)	<input type="checkbox"/>	<input type="checkbox"/>		
		4.6 Air handler cabinet & plenum sealed (or Test)			<input type="checkbox"/>	<input type="checkbox"/>
		4.7 Protect HVAC system from construction dust		<input type="checkbox"/>	<input type="checkbox"/>	
		4.8 Additional dust prevention		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Duct Systems	4.9 Duct system design - Man D or equivalent (or Test)			<input type="checkbox"/>	
		4.10 No ductwork in garage			<input type="checkbox"/>	
		4.11 No building cavities as ducts			<input type="checkbox"/>	
		4.12 Duct system sealed with approved sealant or system			<input type="checkbox"/>	
		4.13 Duct leakage test - total or outside			<input type="checkbox"/>	
		4.14 Transfer ducts/grilles in rooms w/o return (or Test)			<input type="checkbox"/>	
	Ventilation Systems	4.15 Whole house ventilation (ASHRAE Std 62.2)			<input type="checkbox"/>	
4.16 Spot ventilation (ASHRAE Std 62.2)				<input type="checkbox"/>		
4.17 Clothes dryers vented outdoors		<input type="checkbox"/>		<input type="checkbox"/>		

## ENERGY STAR Indoor Air Package Verification Checklist

Address or Div/Lot#:		City:		State:			
Section	#	Requirements (see IAP for details)	N/A	Builder Verified	Rater Verified	Flex Spec	
HVAC	Filtration	4.18	HVAC filters at least MERV 8		<input type="checkbox"/>		
		4.19	No filter by-passes		<input type="checkbox"/>		
		4.20	If central vac, vented outdoors	<input type="checkbox"/>	<input type="checkbox"/>		
Combustion/Garages	Heating Appliances	5.1	Gas furnace/boiler direct vented; oil power vented	<input type="checkbox"/>	<input type="checkbox"/>		
		5.2	Water heaters power vented or direct vented	<input type="checkbox"/>	<input type="checkbox"/>		
		5.3	Fireplace emission & efficiency requirements	<input type="checkbox"/>	<input type="checkbox"/>		
		5.4	Fireplace installation requirements	<input type="checkbox"/>	<input type="checkbox"/>		
	Garage Isolation	5.5	Common walls and ceiling completely sealed	<input type="checkbox"/>	<input type="checkbox"/>		
		5.6	Connecting doors gasketed and automatic closer	<input type="checkbox"/>	<input type="checkbox"/>		
		5.7	Garage exhaust fan	<input type="checkbox"/>	<input type="checkbox"/>		
CO alarms	5.8	Certified CO alarms outside each sleeping area	<input type="checkbox"/>	<input type="checkbox"/>			
Building Materials	Preparation and Installation	6.1	No wet materials enclosed in building assemblies	<input type="checkbox"/>			
		6.2	Paper covered wall board raised 1/2" above slab		<input type="checkbox"/>		
	Materials	6.3	Plywood & OSB "Exterior" grade	<input type="checkbox"/>	<input type="checkbox"/>		
		6.4	Particleboard and MDF ANSI A208 compliant	<input type="checkbox"/>	<input type="checkbox"/>		
		6.5	Hardwood plywood ANSI & HUD std compliant	<input type="checkbox"/>	<input type="checkbox"/>		
		6.6	No wall-to-wall carpet in bathing areas		<input type="checkbox"/>		
		6.7	Water resistant flooring in kitchens, entries, laundry, util.		<input type="checkbox"/>	<input type="checkbox"/>	
		6.8	>1 Perm finish on inside of exterior walls (Humid only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	6.9	Carpet, cushion, & adhesives qualified for CRI Green Label		<input type="checkbox"/>	<input type="checkbox"/>		
Home Commissioning	Final Preparation	7.1	Ductwork dry and dust free		<input type="checkbox"/>		
		7.2	Air handler clean, w/new filter		<input type="checkbox"/>		
		7.3	Supply airflows verified		<input type="checkbox"/>		
		7.4	Refrigerant charge test		<input type="checkbox"/>		
		7.5	Ventilate home before occupancy, or advise buyer	<input type="checkbox"/>	<input type="checkbox"/>		
	Owner Education	7.6	Provide home buyer with completed checklist		<input type="checkbox"/>		
		7.7	Provide homeowner's manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rating Provider:		Final Inspection Date:					
Rating Company Name:		Builder Company Name:					
Rater Signature:		Builder Employee Signature:					

### Verification Instructions:

- Homes verified to comply with these specifications can use "Indoor Air Package" as a complementary label to ENERGY STAR for homes. *Verification is not complete until this checklist is completed in full and signed.*
- Check one box per line: "N/A" for specifications that do not apply according to Indoor Air Package requirements (i.e. *Exceptions*); "Builder Verified" or "Rater Verified" as appropriate for items that must be verified.
- Builder may choose to "opt out" of up to 3 specification items listed in the "Flex Spec" column. These specification items are considered "best practices", but may not be required to achieve significant IAQ risk reduction, therefore some flexibility is provided.
- The Provider or Rater is required to keep a copy of the completed and signed checklist with ENERGY STAR documentation for the home.
- The Checklist may be completed for a batch of homes using a RESNET-approved sampling protocol when qualifying homes as ENERGY STAR. For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be completed for the one home that was rated.

Disclaimer: The construction practices and technical specifications that comprise the ENERGY STAR Indoor Air Package are designed to contribute to improved indoor air quality in new homes compared to standard code-built homes. However, these measures alone will not guarantee that homebuyers will not experience air quality problems in their homes. Rather, the Indoor Air Package should be viewed as a way to reduce the likelihood of experiencing such problems.

**Chart B: Environmentally Preferable Products/Locally Sourced Materials**

Assembly	Component	Product Specification Types (see Note 1)		
		Specifications	Emission Specifications	Local
Exterior Wall	Framing	FSC-certified		X
Exterior Wall	Framing	Finger-jointed studs (vertical use only for structural components)		X
Exterior Wall	Siding or masonry	Recycled content or FSC-certified		X
Floor	Flooring	BONUS 1/2 for 90% or more	BONUS 1/2 for NO carpet in home	
Floor	Framing	FSC-certified		X
Foundation	Aggregate			X
Foundation	Cement	Fly ash or slag as replacement for, not addition to, cement content (min. 30%)		X
Interior Wall	Framing	FSC-certified		X
Interior Wall	Framing	Finger-jointed, (vertical use only for structural components)		X
Interior Walls AND ceilings	Gypsum board	Recycled content		X
Interior Walls AND millwork	Paint		Comply with Green Seal Standard GS-11, Paints, First Edition, May 20, 1993	
Interior Walls AND millwork	Wood finishes		VOC concentrations of 150 gpl or less	
Landscape	Decking or patio material	Recycled content or FSC-certified		X
Other	Cabinets	Recovered, recycled content, or FSC-certified	Wood and/or agrifiber products with no added urea-formaldehyde resins	X
Other	Counters	Recycled content	Wood and/or agrifiber products with no added urea-formaldehyde resins	
Other	Doors (not incl. garage)	Recycled content or FSC-certified	Wood and/or agrifiber products with no added urea-formaldehyde resins	X
Other	Trim	Recovered, recycled content, or FSC-certified	Wood and/or agrifiber products with no added urea-formaldehyde resins	
Other	Adhesives and sealants		VOC concentrations of 70 gpl or less	
Roof	Framing	FSC-certified		X
Roof	Roofing	Recycled content or vegetated (min. 200 sq)		X
Roof AND floor AND wall	Insulation	Recycled content (min 20%)	Comply with State or California, DHS, "Practice for Testing or VOCs from Building Materials using Small Chambers"	X
Roof, floor, wall (2 of 3)	Sheathing	Recycled content or FSC-certified		X

Note 1: A maximum of 2 points can be earned for any single component listed in Chart B (e.g., roofing, siding, etc.) regardless of the amount by which a minimum performance threshold is exceeded.

Note 2: "Recycled content" products must contain a minimum of 25 percent post-consumer recycled content except as noted otherwise above. Post-Industrial (pre-consumer) recycled content is counted at half the rate of post-consumer content.

Example:

Floor-Framing-FSC-certified: 90% of the floor framing must use FSC-certified lumber to qualify for .5 point. If it were harvested and processed within 500 miles it earns an additional .5 point. Total of 1 point possible.



## Accountability Form

### City of Boulder's Green Building /Green Points Program

Permit number: \_\_\_\_\_

All declarations and affirmations made in this Accountability Form are made to the city of Boulder solely for the purpose of assisting the city in determining whether the Green Points options are merited. No such declaration or affirmation can be construed as a warranty or guarantee of the performance of the building.

**INSTRUCTIONS:** This form is to be completed by the applicant/building professional for the design and/or implementation of one or more of the Green Points options listed below.

**Step 1.** Review the options in the Green Building and Green Points Guideline Booklet that you are proposing to implement into your project.

**Step 2.** In the Areas of Accountability section, place your initials in the space provided to indicate the Green Points options chosen, having implementation responsibility. Attached the verification documents detailed in the Guideline Booklet.

**Step 3.** Complete the Official Verification section at the bottom of the page.

**Step 4.** Maintain a project documentation file/binder to assist and track in the event of an audit of your options or of this project by the city of Boulder.

**Step 5.** Place form and supporting Green Point option documentation in building permit sleeve before final inspection.

Applicant Name: \_\_\_\_\_

Project Address: \_\_\_\_\_ City/Zip: \_\_\_\_\_

#### Areas of Accountability

##### Energy Efficiency - Remodels and Additions - ONLY

\_\_\_\_ (e)(6)(A) ENERGY STAR Advanced Lighting Package

\_\_\_\_ (e)(6)(B) Efficient Light Controls

\_\_\_\_ (e)(6)(C) Energy Efficient Appliances

##### Sustainable Products

\_\_\_\_ (i)(1) FSC-Certified Tropical Wood or No Tropical Wood

\_\_\_\_ (i)(2) Select Environmentally Preferable Materials

\_\_\_\_ (i)(3) Select Locally Sourced Materials

##### Indoor Air Quality – New Construction -ONLY

\_\_\_\_ (j)(1) ENERGY STAR Indoor Air Quality Package

#### Official Verification (to be completed by the building projects responsible party/applicant)

By affixing my signature below, the undersigned hereby declare and affirm to the city of Boulder that the Green Points options checked off on above, matches the application and meets the specification of the Green Points program Guideline Booklet requirements. These options, if audited, will meet the standards set forth in the program, and I will provide necessary supporting documents.

Responsible Party

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

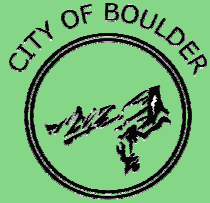
Project Role/ Title: \_\_\_\_\_

Company Name: \_\_\_\_\_

Signature: \_\_\_\_\_

HERS Rater Name: \_\_\_\_\_

Signature: \_\_\_\_\_



City of Boulder  
Green Points Program

# Materials

**Presented By: ML Robles, NCARB Architect**

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